The Effectiveness of Preselection Diversity Indoor Wireless Systems

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Overview

- What's the problem we are trying to solve?
- What is receive diversity and why is it useful?
- System design
- Performance results
- Comparison with theory
- Conclusion

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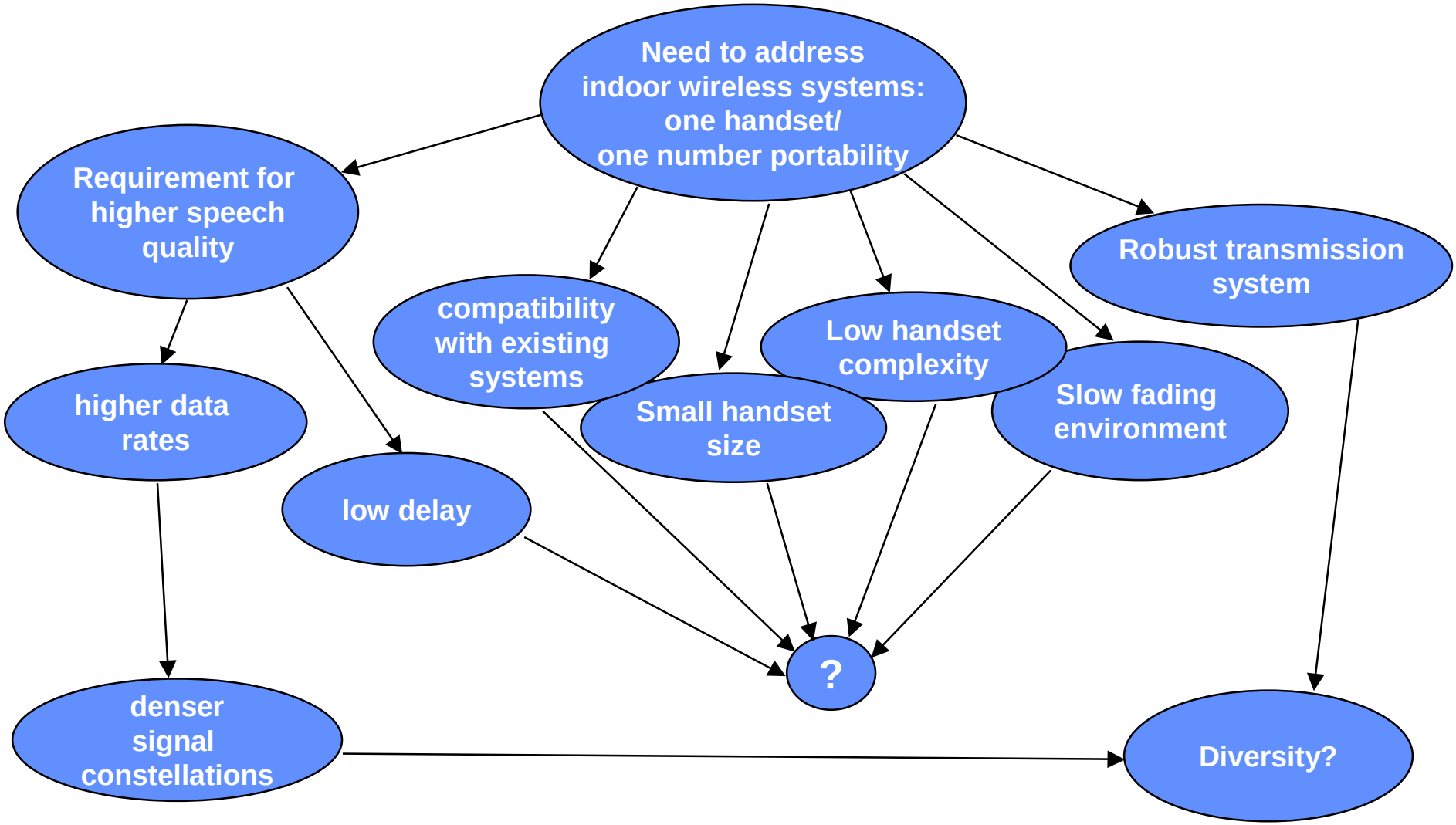
The Problem



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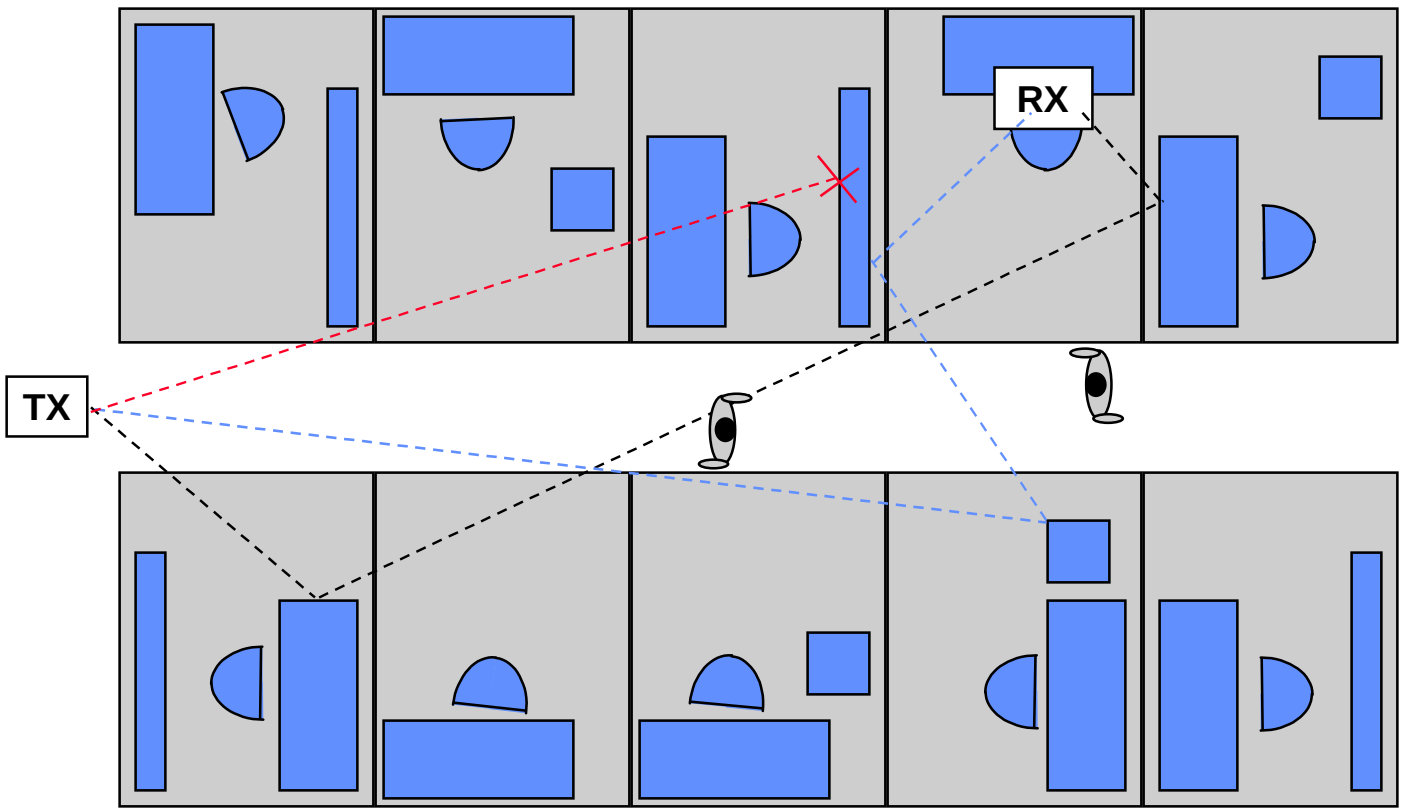
Multipath fading - Indoors



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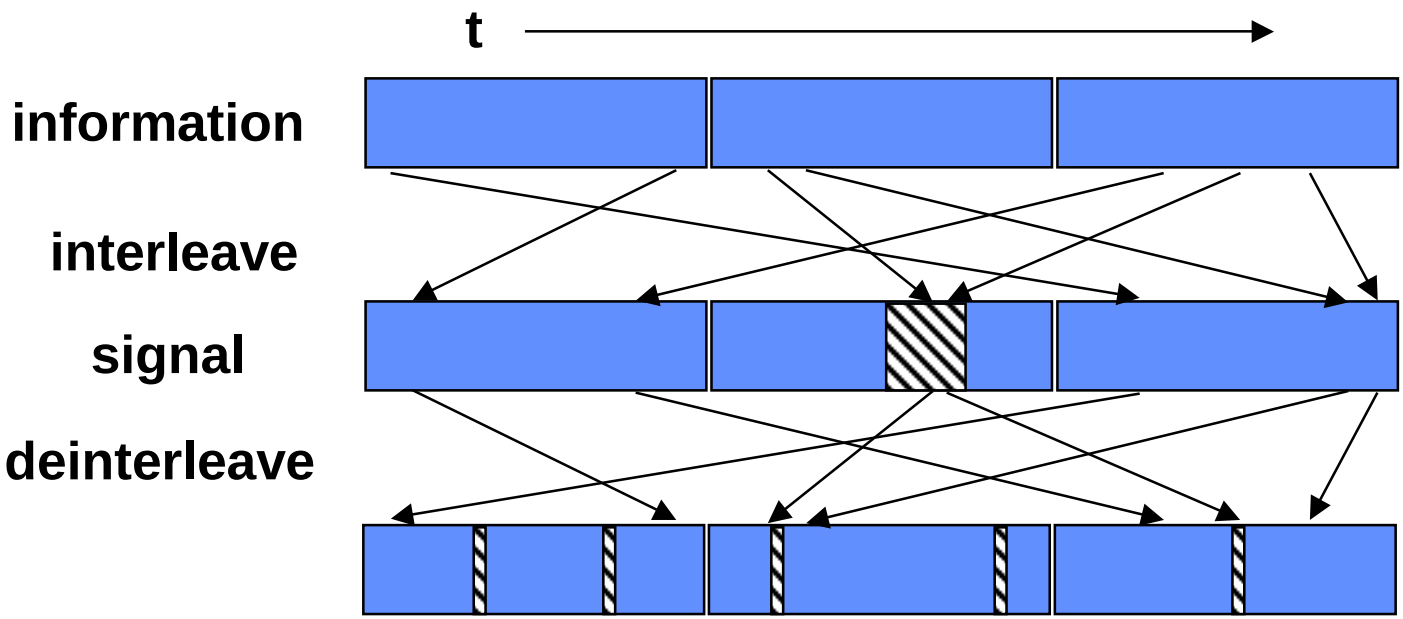
Time Diversity



- adds significant delay to processing

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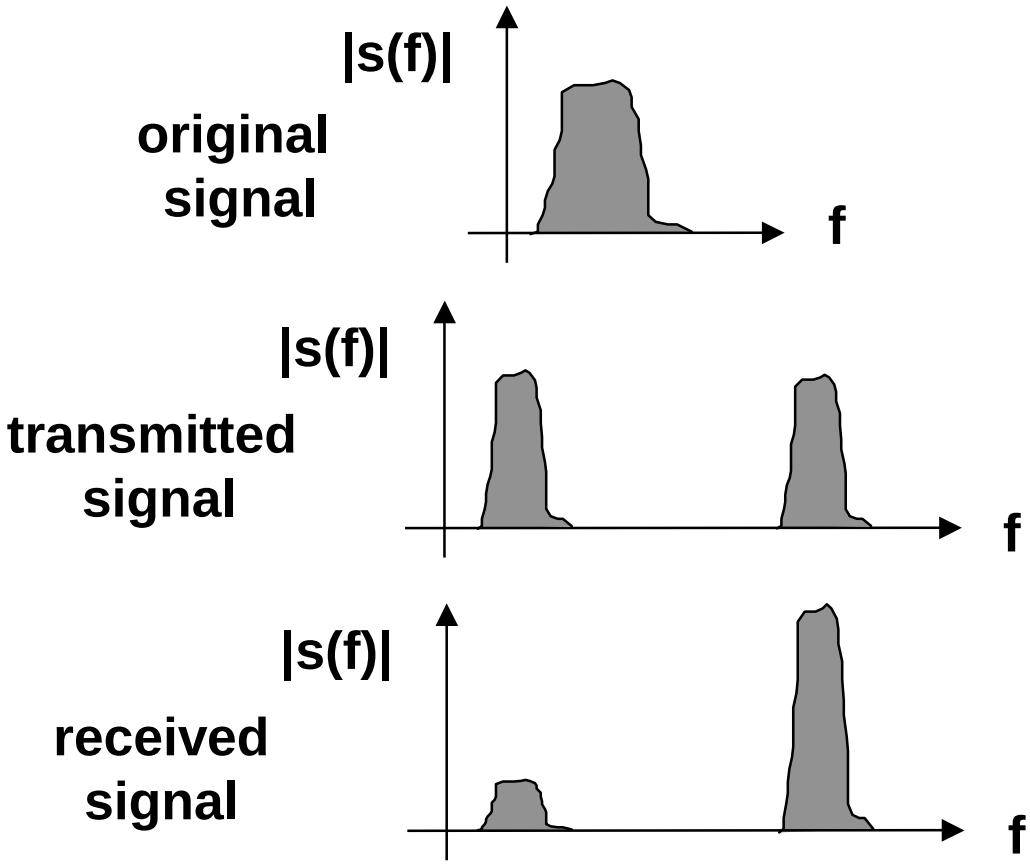
Frequency Diversity



- complicates system
- requires additional spectrum
- incompatible with nondiversity system

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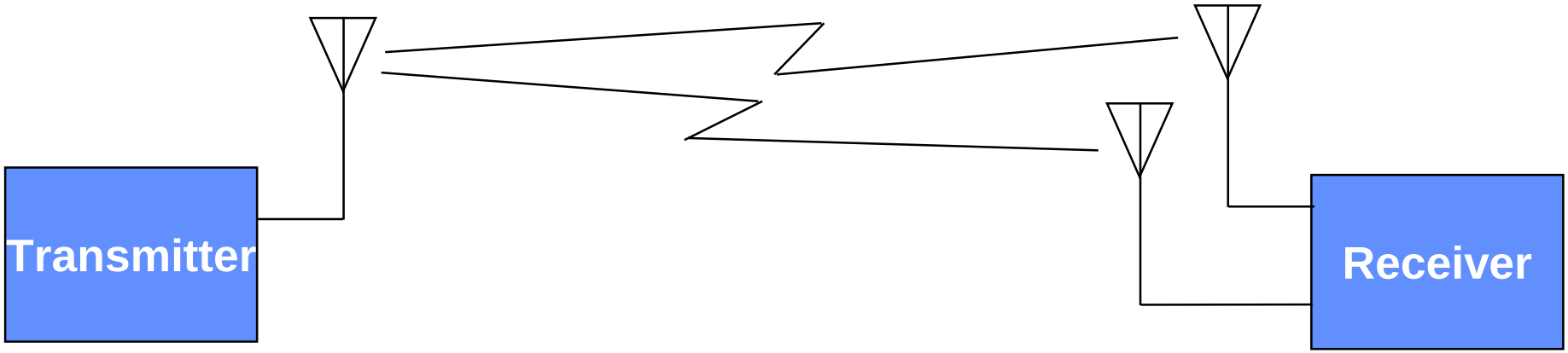
Antenna Diversity



For effective combining:

- **received signals must have low cross-correlation**
- **signal levels must be comparable**

An efficient combining means is required (e.g., MRC requires two full receivers)

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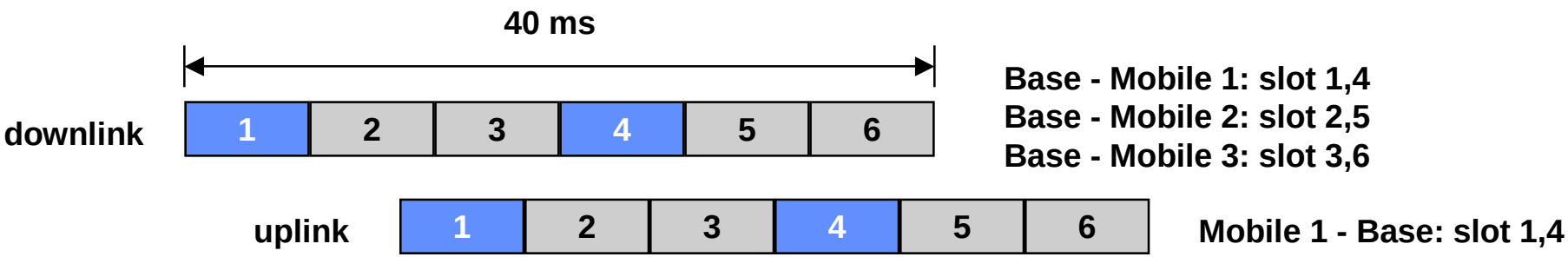
System Design

IS-136 TDMA frame structure



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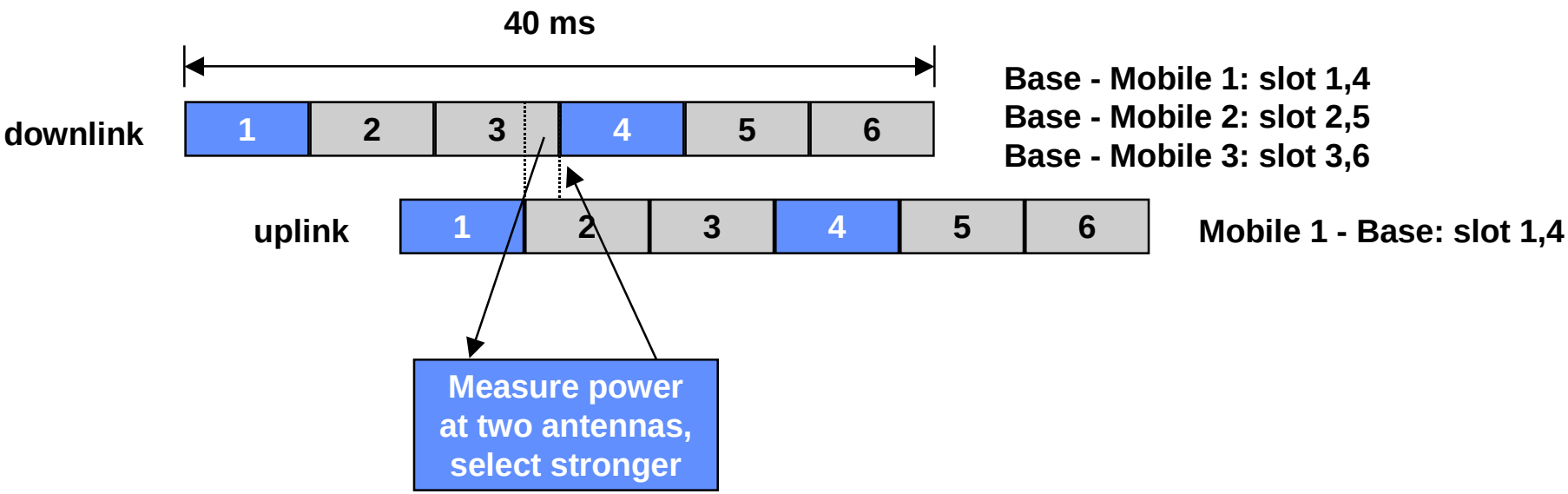
System Design - Preselection Diversity

IS-136 TDMA frame structure



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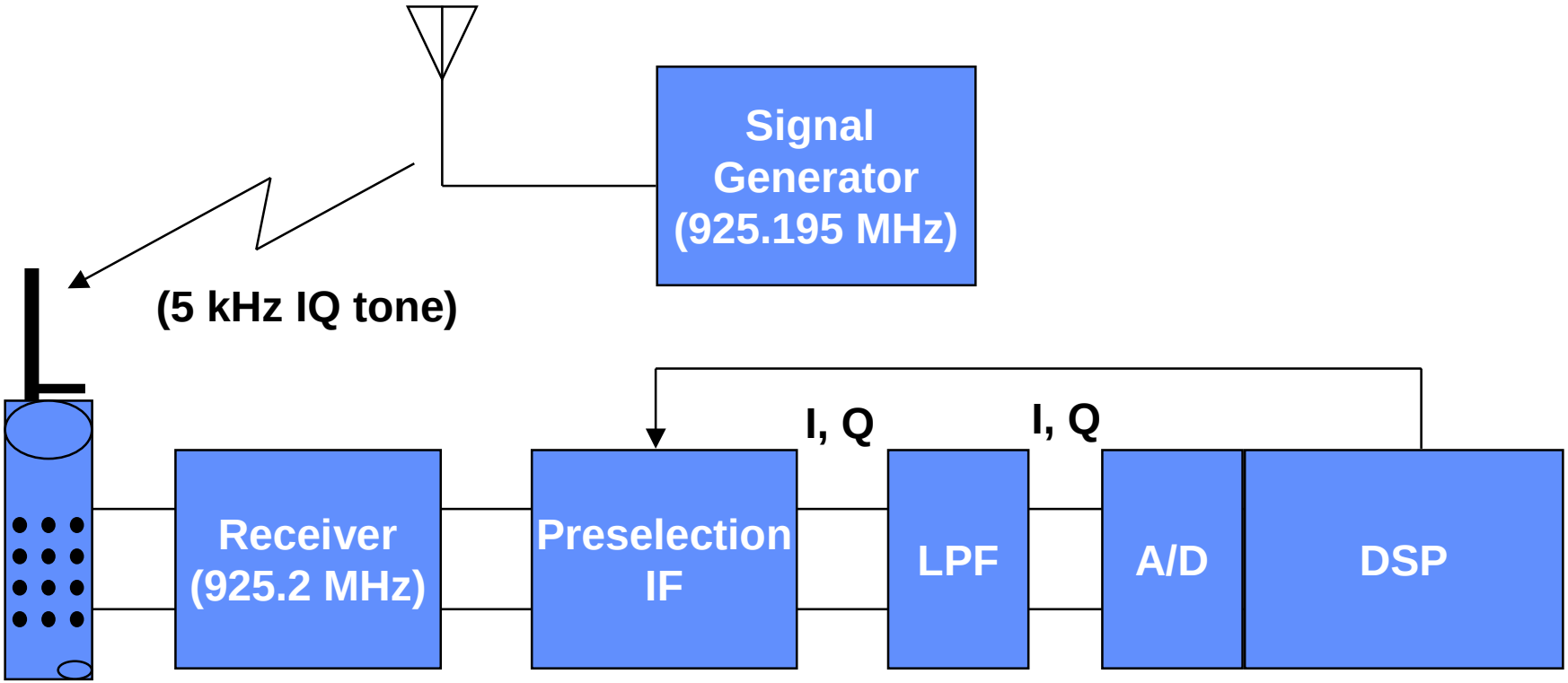
Experimental Platform



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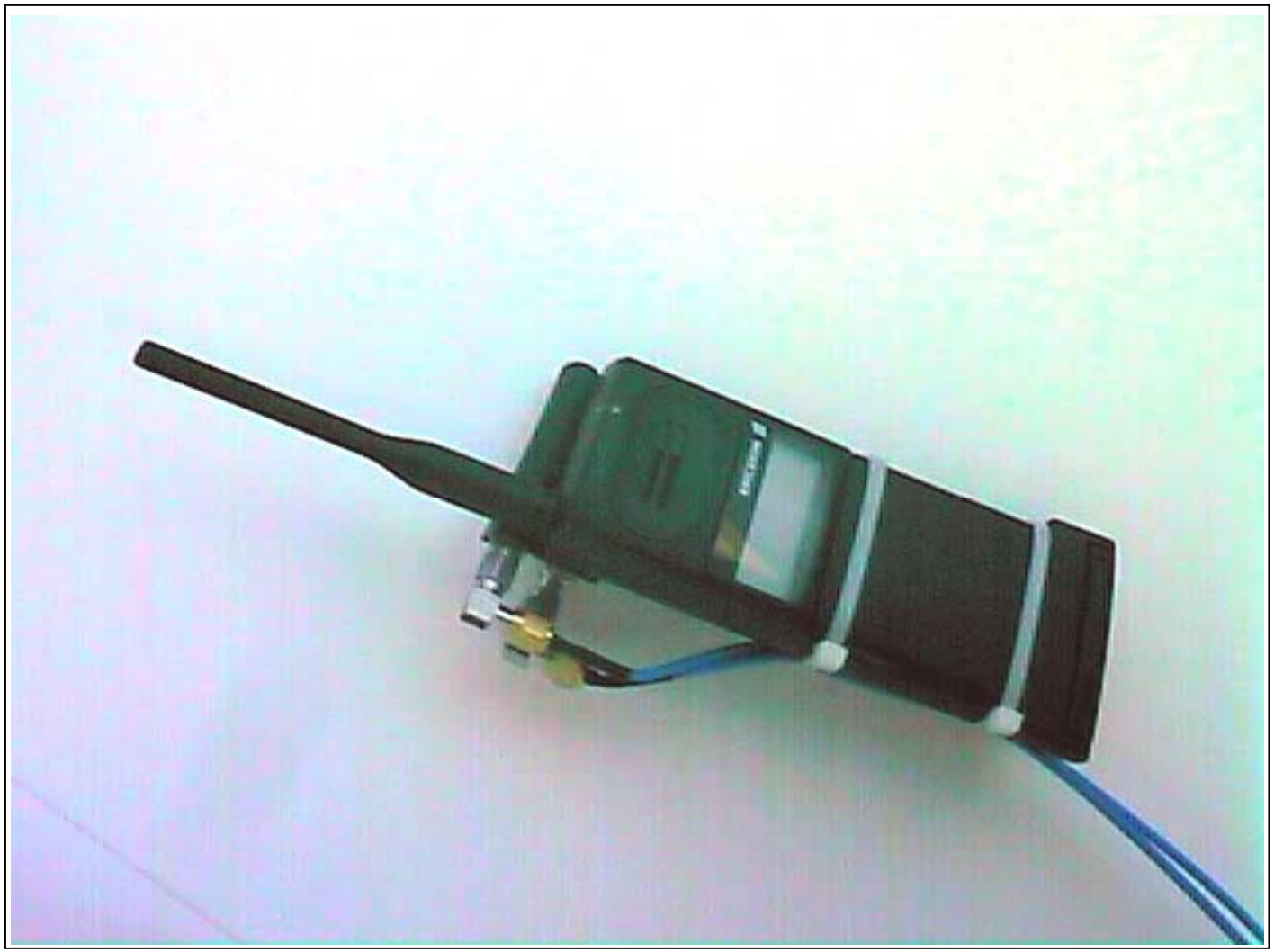
Modified Commercial Handset



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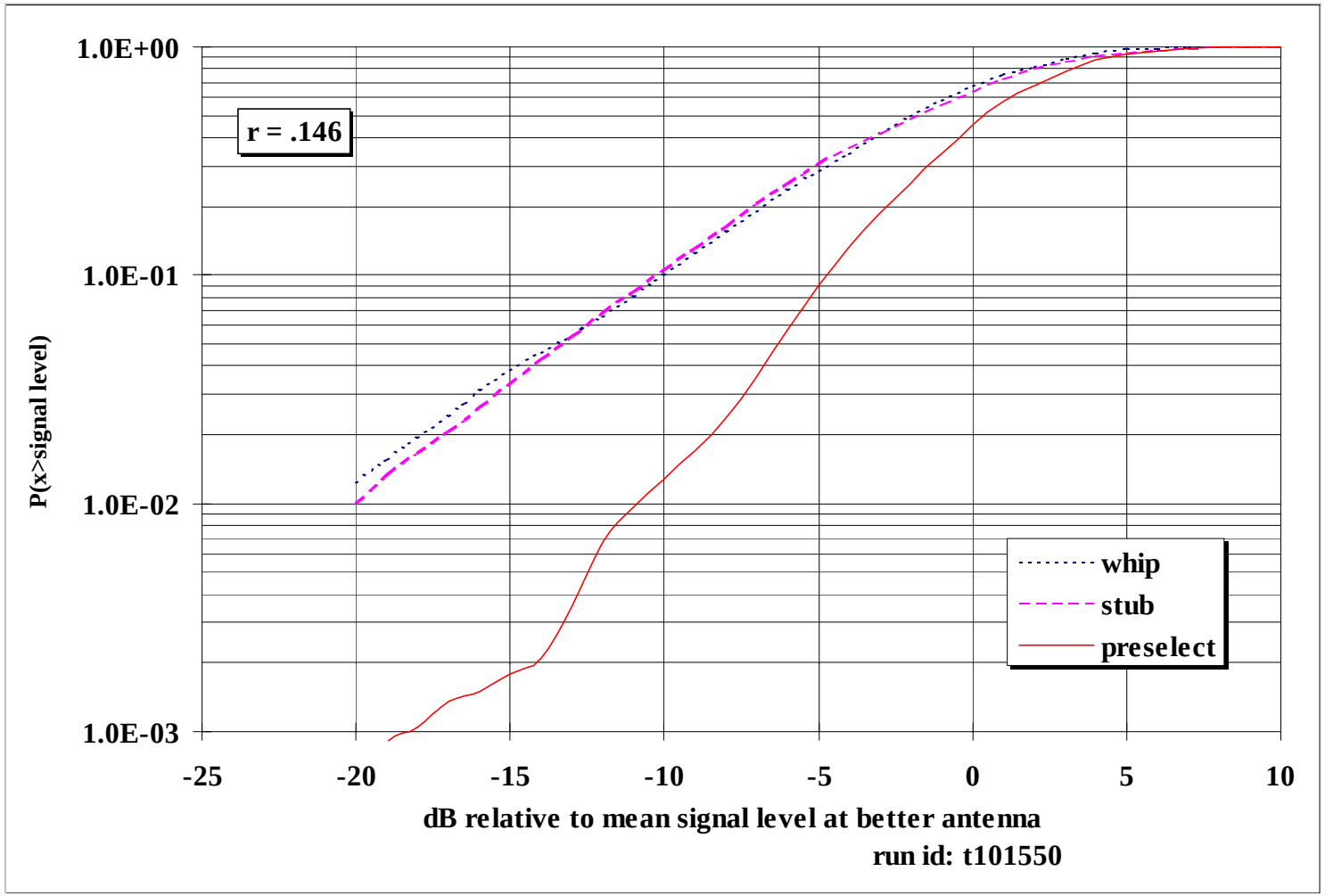
Performance Results



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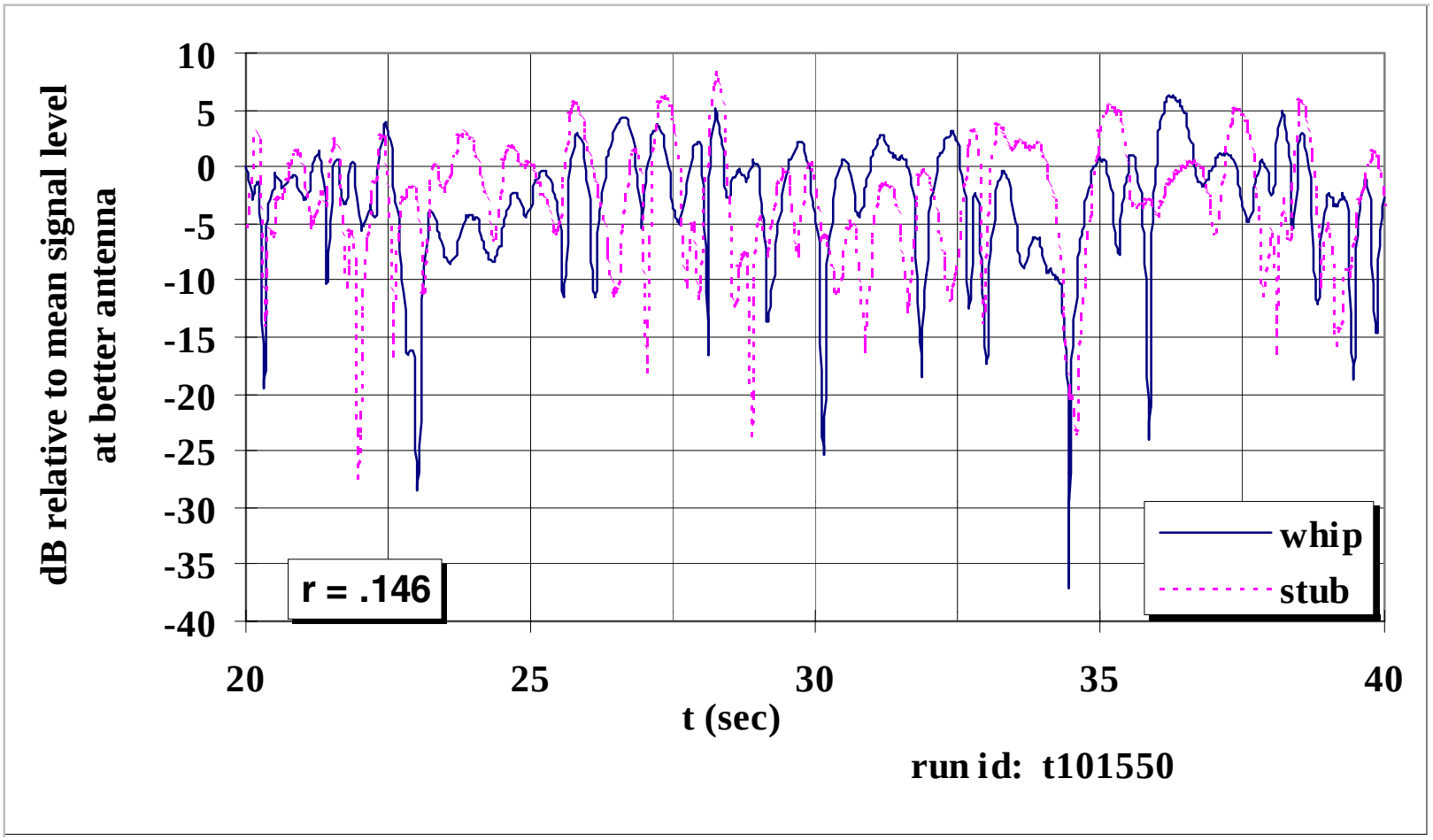
A Typical Fading Profile



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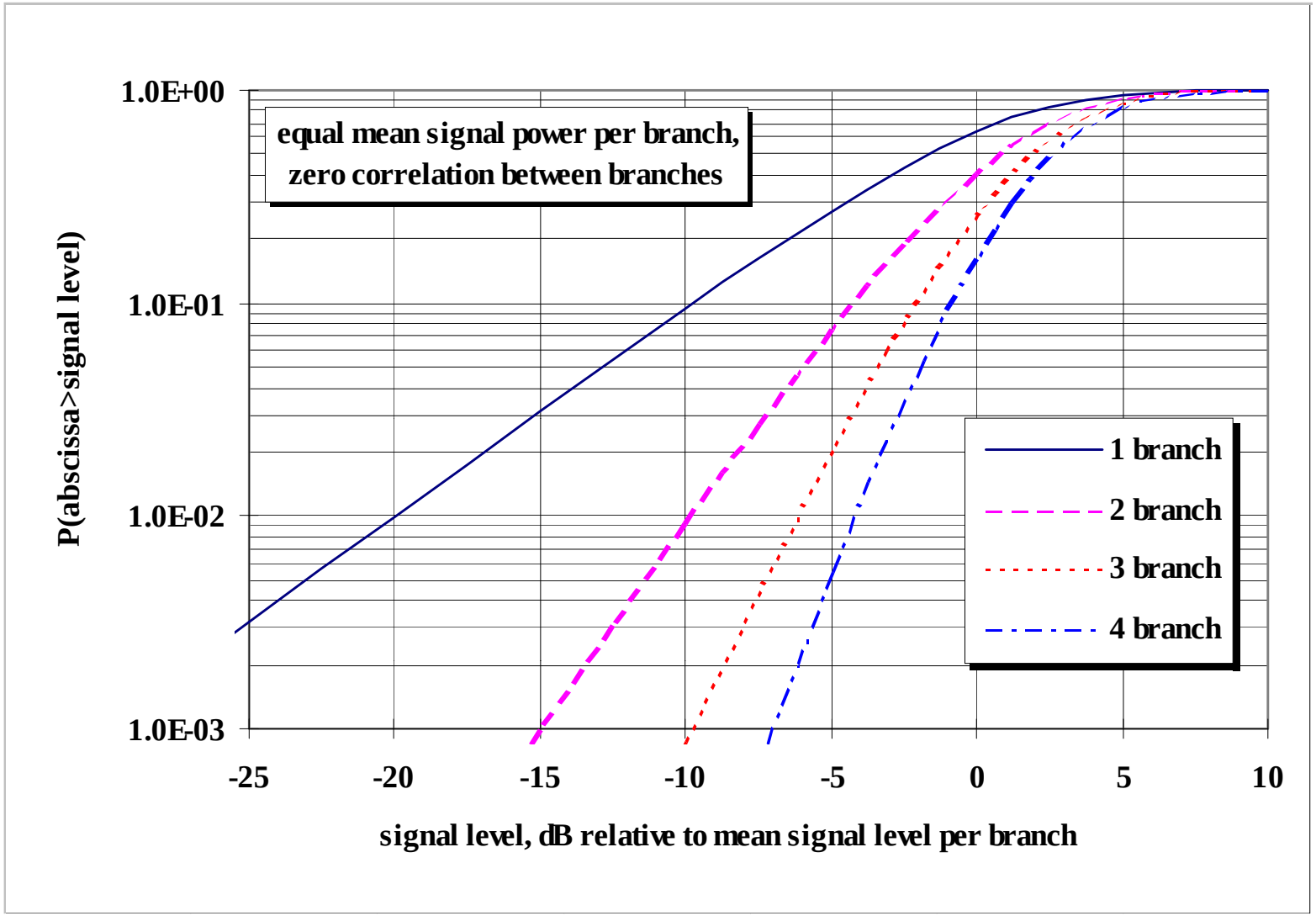
Comparison with theory



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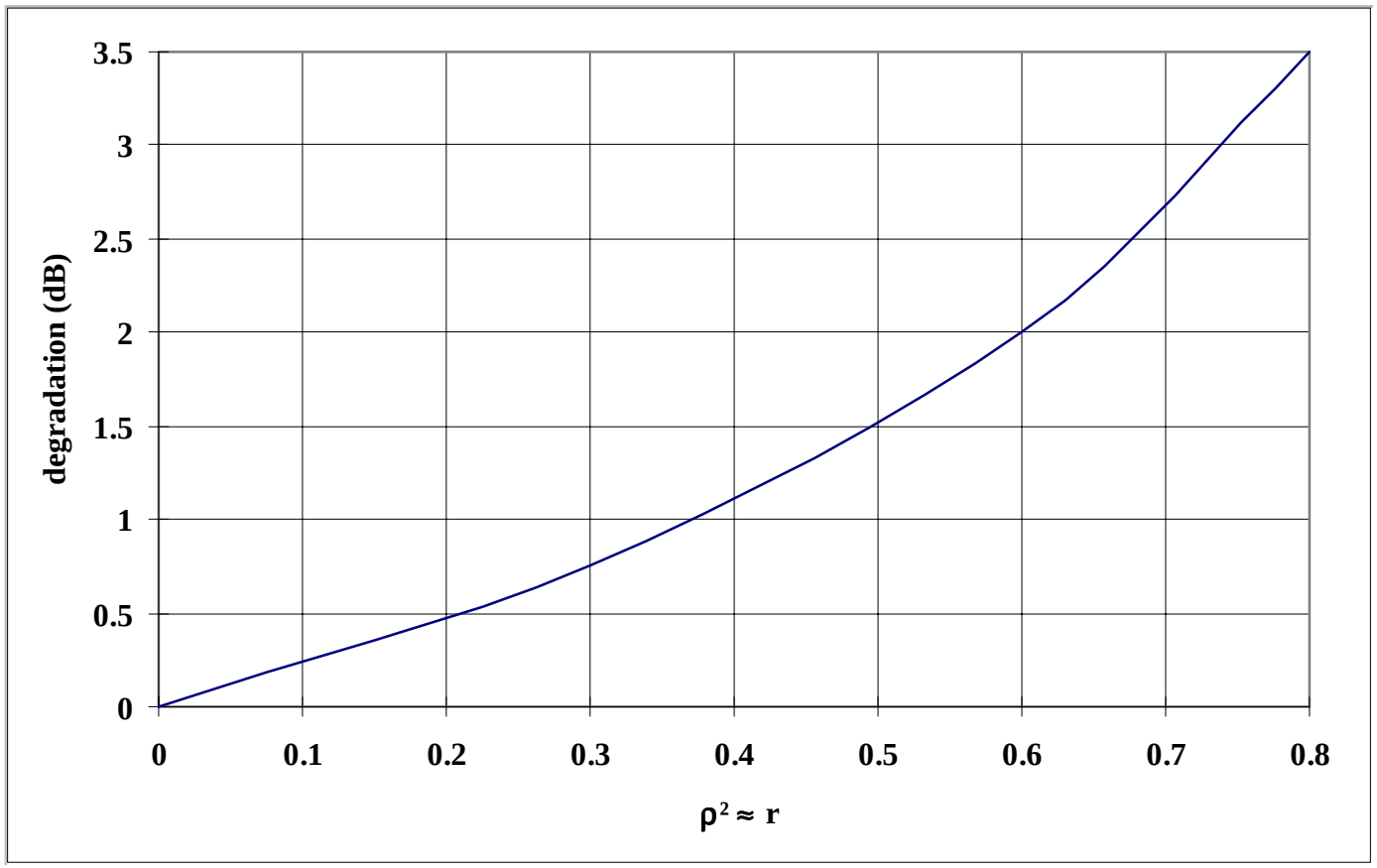
Theoretical Degradation due to Correlation between Antennas



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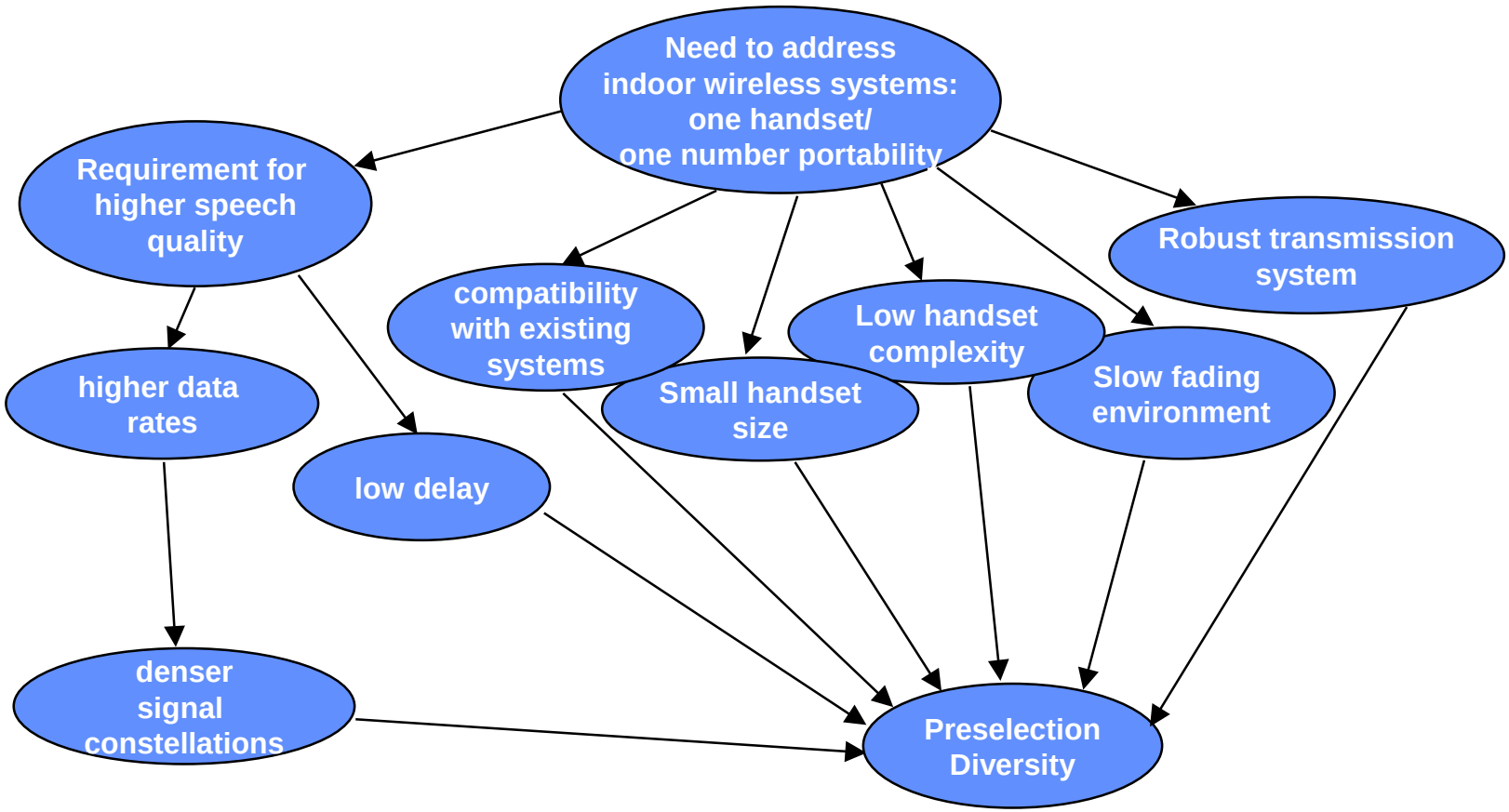
Conclusion: The Problem - and a Practical Solution



- Supports 16 kb/s with $\pi/8$-8ϕDPSK constellation
- compatible with existing IS-136 systems
- Good antenna decorrelation (r < .2) via polarization diversity with minimal size/complexity impact

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